(12) UK Patent Application (19) GB (11) 2 124 289 A

(21) Application No **8218569**
(22) Date of filing **26 Jun 1982**
(43) Application published
15 Feb 1984
(51) **INT CL³**
F16B 2/10
(52) Domestic classification
E2A 370 372 375 379 417 GM
F2G 24B7
U1S 1573 E2A F2G
(56) Documents cited
GB A 2051213
GB 1528935
GB 1155477
(58) Field of search
E2A
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(54) **Pipe clamp**

(57) A pipe clamp for use in clamping together metal pipe sections, for example exhaust pipe sections, consist of an arcuate first part (1) formed from a sheet metal pressing to which a second arcuate part (3) is pivoted at one end (7), the second part having a straight screw threaded shank (8) which, upon closure of the clamp, is located in a channel (5) formed in the first part and which projects beyond this channel to receive a clamping nut (10). The clamping nut upon tightening brings a locking element (9) into locking engagement with a slot or other abutment (13) at one end of the channel (5) to lock the clamp.

FIG.1

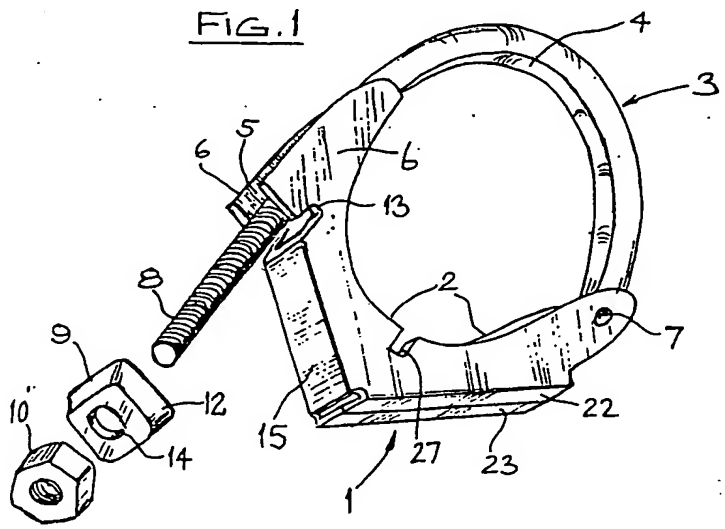
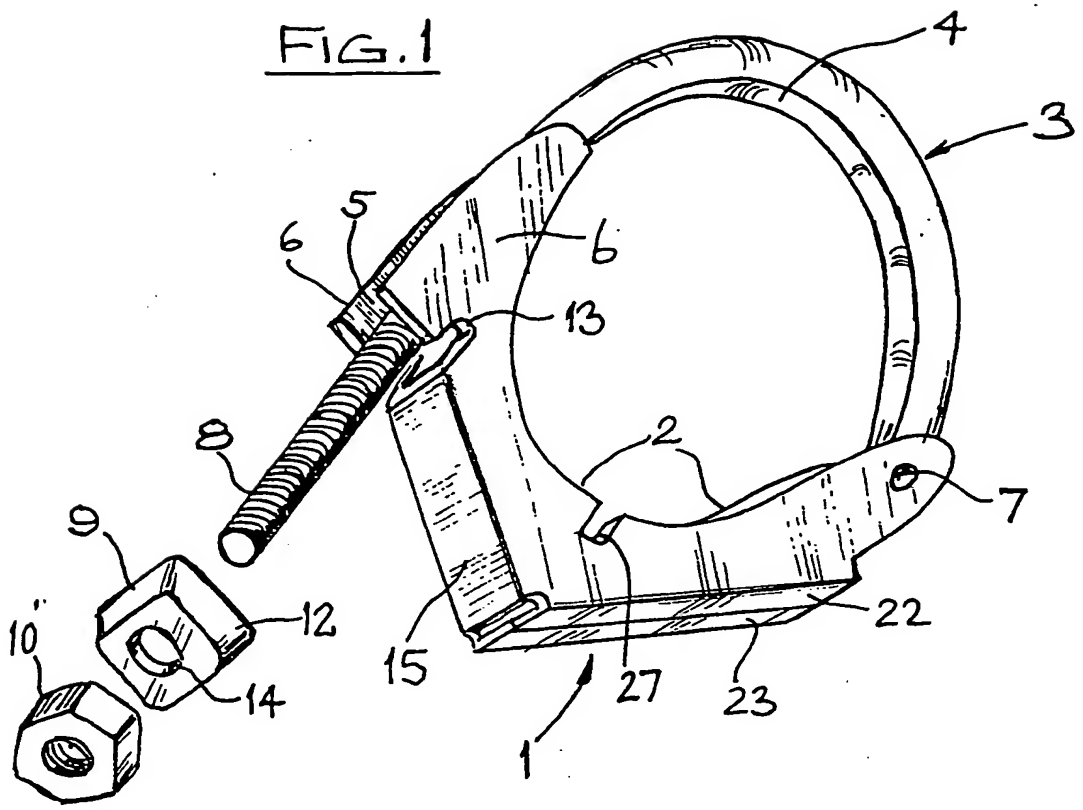


FIG.1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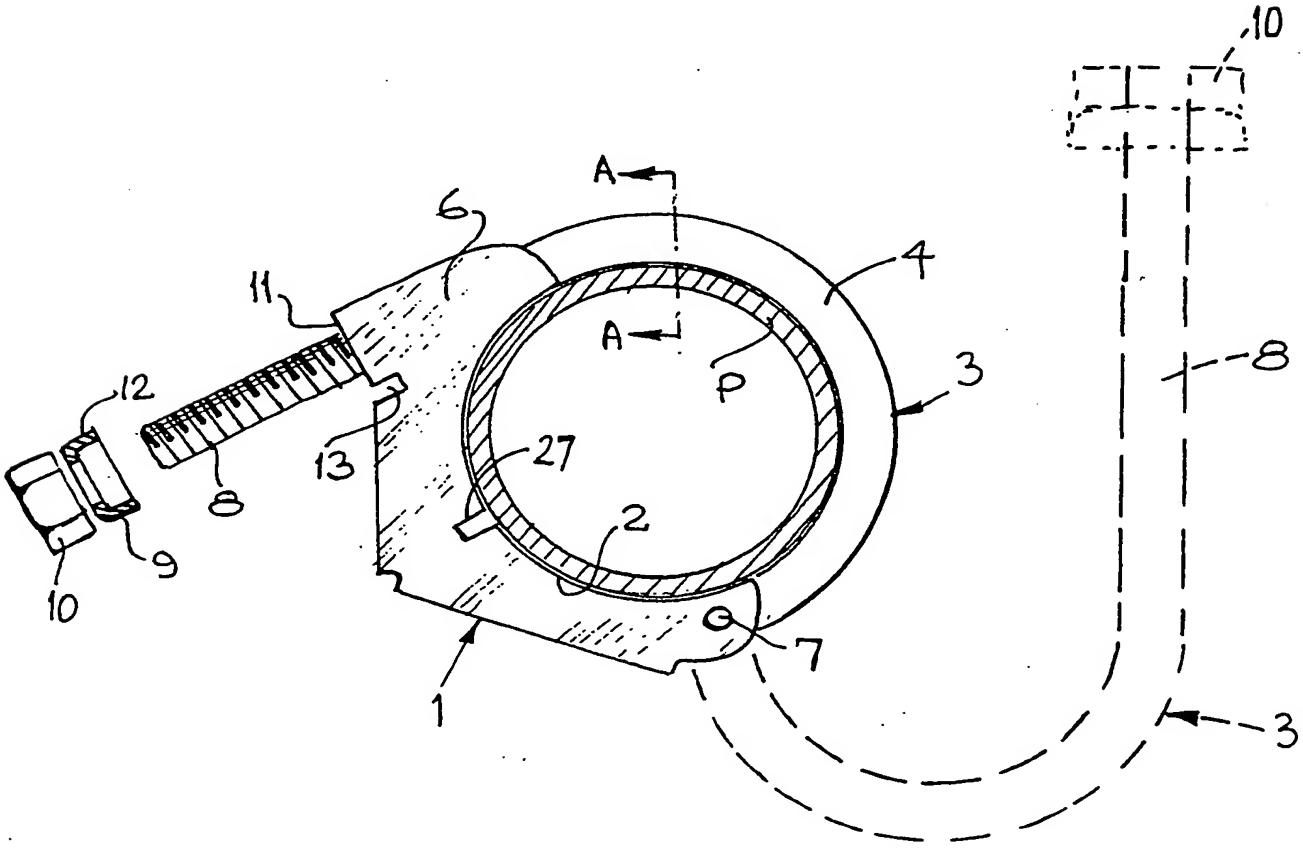
10
A
6
4
11
A
P
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12
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2
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1
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3

FIG.3

FIG.4

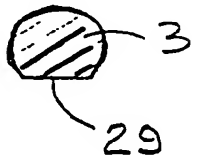
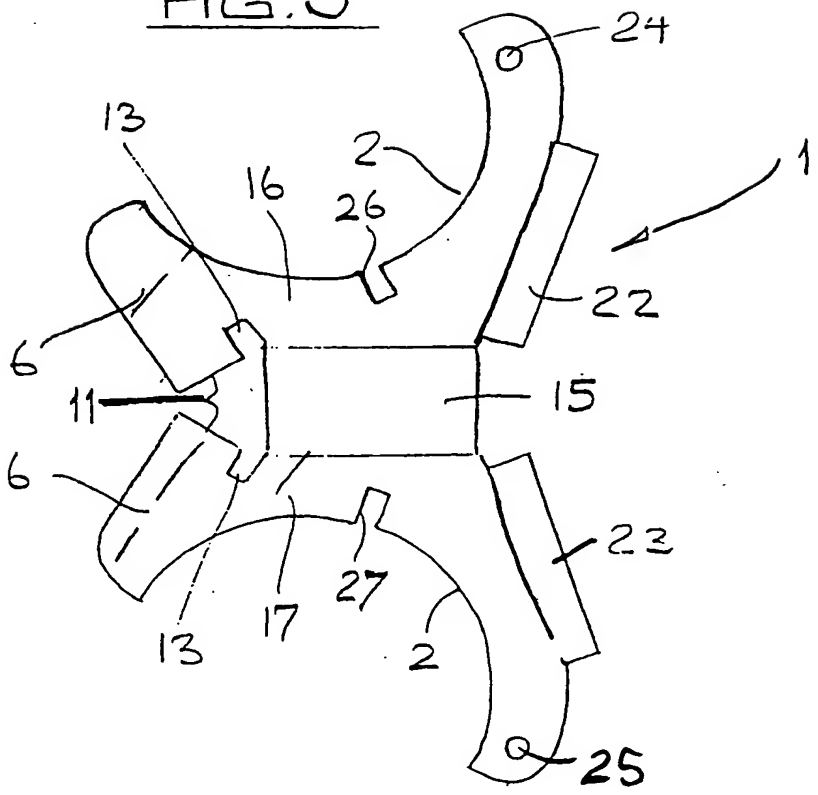


FIG.5



SPECIFICATION

Pipe clamp

This invention relates to a pipe clamp suitable for the clamping together of sections of metal pipe, with particular, but not exclusive, application to the interconnection of sections of exhaust pipe in motor vehicles.

The most commonly used form of clamp for joining sections of motor vehicle exhaust pipe consists of a U-bolt having two straight threaded end shanks and a saddle piece which fits over the end shanks of the U-bolt and which is retained in position by two clamping nuts threaded onto the end shanks of the U-bolt. In order to tighten the clamp around a section of pipe both nuts have to be tightened. This type of pipe clamp suffers from a number of practical disadvantages. In the first place, the clamp has to be completely disassembled in order to fit it around a section of exhaust pipe; when working in the confined area beneath a motor vehicle it is easy to mislay one of the locking nuts or washers in the process of assembling the clamp on an exhaust pipe. A further disadvantage is that the two arms of the U-bolt must extend downwardly, in order for the threaded end shanks to be accessible for the tightening of the nuts. The downward projection of the two ends of the U-bolt can present a fouling obstruction on the underside of a vehicle to which the clamp is fitted.

Alternatives to the U-bolt clamp described above have been proposed for use on motor vehicle exhaust pipes. One of these alternatives is a clamp having a first generally U-shaped component of pressed sheet metal and a second generally U-shaped component of bent wire or rod. The rod has a hook at one end which engages in one end of the first component, and has a screw threaded shank at its other end upon which a clamping nut is threaded. One such exhaust pipe clamp is described and illustrated in British Patent Specification No. 1155477. This type of clamp still suffers from the disadvantage, however, that its two clamping parts are separate components which have to be placed separately around an exhaust pipe to be clamped before the two parts are hooked together and the clamping nut tightened.

The present invention seeks to provide an improved pipe clamp suitable for exhaust pipes in which the components of the clamp are permanently interconnected, while at the same time permitting easy fitting of the clamp around a pipe.

According to the present invention there is provided a pipe clamp comprising a first part defining an arcuate surface forming one jaw of the clamp, an external channel provided at one end of the first part, and a second part having a permanent pivotal connection to the other end of the first part, the second part having an arcuate portion adjacent the pivot forming a second jaw and terminating in a straight screw threaded shank which, upon closure of the clamp, is located in and projects beyond one end of the channel, and a clamping nut which engages the projecting end of the threaded shank and which upon closure of the clamp can be tightened to bring a locking element into abutment with the said one end of the channel.

Since the two jaws of the pipe clamp are interconnected by a permanent pivotal connection there is no risk of losing one component of the clamp when fitting the clamp to a pipe. Fitting of the clamp is easily accomplished by locating one of the jaws around the section of pipe to be clamped and then swinging the other jaw into position so that the shank of the second part is located in the channel of the first part. The clamping nut is then tightened, by hand or by means of a power tool, to bring the locking element into abutment with the adjacent end of the channel in the first part, and thereby draw the two jaws of the clamp together around the pipe.

The threaded shank of the second part clearly has to have a sufficient length to enable it to be swung into and out of the external channel in the first part without the nut and locking element threaded on to this shank fouling any part of the first part. The length of the threaded shank need not, however, present any disadvantage when the clamp is located on a motor vehicle exhaust pipe, since the clamp can be fitted to a pipe with the shank extending substantially horizontally or laterally, rather than vertically, so that it does not project downwardly and present a potential obstruction. Moreover, the threaded shank can be utilised for attachment to support brackets for the exhaust pipe.

The locking element preferably abuts a shoulder on the first part of the clamp when the nut is tightened. This shoulder may be formed at the said one end of the external channel in the first part. In order to provide for positive locking of the clamp when the jaws are closed around a pipe, the first part is, in a preferred embodiment of the invention, provided with a notch adjacent the abutment shoulder in which a key or flange carried by the locking element engages upon tightening of the nut to lock the second part positively relative to the first part and prevent opening of the clamp when the nut has been tightened. Thus the locking element may comprise a washer having a central aperture through which the shank passes freely, the washer having a peripheral flange which engages in the notch in the first part.

In an alternative embodiment of the invention the locking element may comprise a split washer located on the shank of the second part.

The first part of the pipe clamp is preferably formed by pressing from heavy duty sheet metal. A notch or notches may be formed in the inner arcuate surface of the first part to permit a limited flexing of this part in order to adapt the arcuate surface of this part to pipes of different sizes.

The second part of the clamp preferably comprises a metal bar or rod bent to the

appropriate shape. In order to spread the load exerted by the second part on a clamped pipe the bar or rod may have in cross section a flat portion for engagement with the pipe surface.

Alternatively, the bar or rod forming the second part may be formed with two or more circumferentially extending ribs on its internal surface for contacting the surface of a pipe to be clamped.

The invention will be further described, by way of example only, with reference to the accompanying drawings, in which:

Figure 1 is a diagrammatic perspective view of a pipe clamp according to one embodiment of the invention;

Figure 2 is a diagrammatic cross section of a pipe to which the clamp shown in Figure 1 has been fitted;

Figures 3 and 4 are cross sectional views taken on line A—A of Figure 2 of two different variants of the second part of pipe clamp shown in Figures 1 and 2,

Figure 5 is a plan view of a sheet metal blank from which the first part of the pipe clamp of Figures 1 and 2 is formed.

The illustrated pipe clamp according to the invention comprises a first part 1, pressed from sheet metal, having arcuate surfaces 2 and forming one jaw of the clamp, and a second part 3, formed from metal rod or bar, having an arcuate portion 4 forming a second jaw of the clamp. The first part 1 is provided at one end with an external channel 5 defined between two parallel walls 6 of the sheet metal pressing from which the part 1 is formed. At its other end the first part 1 is provided with a permanent pivotal connection to the second part 3 in the form of a mild steel rivet 7 passing through the two parallel walls 6 of the first part 1 and through the adjacent end of the second part 3.

The second part 3 of the clamp terminates in a straight screw threaded shank 8 adjoining the arcuate portion 4. A locking element 9 is held captive on the shank 8 by means of a clamping nut 10 threaded on the shank.

The clamp can be opened by swinging the two jaws apart about the pivot 7. The open position of the second part 3 relative to the first part 1 is shown in broken outline in Figure 2. With the clamp in its open position the arcuate surfaces 2 of the first part 1 are placed in circumferential contact with the surface of a pipe P to be clamped, and the second part 3 is then swung about the pivot pin 7 into its closed position, with the nut 10 and the locking element 9 located at or near the end of the threaded shank 8. Upon swinging the part 3 into its closed position the shank 8 is seated in the channel defined between the two walls 6 of the first part 1, as shown in solid outline in Figure 2. The clamping nut 10 can then be tightened, bringing the locking element 9 into abutment with shoulders 11 formed at the adjacent end of the channel defined by the walls 6. Further tightening of the nut 10 will then have the effect of tightening the clamp around the pipe P.

To avoid any tendency for the shank 8 to be displaced out of the channel in the first part 1 the locking element 9 carried on the shank 8 is provided with a peripheral skirt or flange 12 which engages in a notch or notches 13 provided in the part 1 adjacent the shoulders 11. In the illustrated embodiment the locking element 9 comprises a washer of generally square shape having a central aperture 14 through which the shank 8 passes freely, while the peripheral skirt or flange 12 is continuous. By providing the flange 12 on all four sides of the square locking element 9, rather than on one side only, the precise orientation of the element 9 on the shank 8 is less critical when tightening the clamp. Once the skirt or flange 12 of the locking element 9 has engaged in the notch 13 and the locking element 9 has been clamped against the shoulders 11 by tightening of the nut 10 the clamp is effectively locked in its closed position.

The first part 1 of the clamp is, as stated previously, formed by pressing from heavy gauge sheet metal, for example 14 swg mild steel plate. The blank from which the part 1 is pressed is shown diagrammatically in plan form in Figure 5. The blank has a base portion 15 interconnecting two portions 16, 17 having mirror-symmetry. The portions 16, 17 are bent at right angles to the base portion 15 to form the two parallel walls 6. Two wings forming parts of the walls 6 define the sides of the channel 5 in the first part 1. Straight edges of the walls 6 together define the shoulders 11 when the part 1 is formed. The two notches 13 in which the skirt or flange 12 of the locking element 13 engage are formed in the blank between the two shoulder edges and the base portion 15. On the opposite side of the base portion 15 of the blank from the two walls 6 two rectangular flaps 22, 23 are formed in the portions 16, 17. These flaps 22, 23 are bent at right angles to the wall portions 16, 17 upon forming the blank to form two coplanar flanges which abut each other in the formed part 1, as shown in Figure 1, effectively spacing the two walls 6 from each other. The blank is further provided with two through punched holes 24, 25 which are aligned with each other in the formed part 1 to receive the pivot pin 7.

The two arcuate surfaces 2 of the first part 1 are provided with centrally disposed notches 26, 27 which permit a limited deformation of the first part 1 when formed to enable it to be adjusted within limits to fit pipes of different sizes.

The second part 3 of the clamp is formed from a length of mild steel bar or rod of nominally circular cross section. The arcuate portion 4 of the second part 3 is formed on its inside surface with two circumferential ribs 28 (Figure 3) which make contact with the surface of a pipe P to be clamped and thereby spread the clamping load. In an alternative embodiment, illustrated in Figure 4, the part 3 may have a cross section with a flat 29

on its inside face for load-spreading contact with the surface of a pipe P to be clamped.

It will be seen from Figure 2 that the clamp can be assembled on an exhaust pipe of a motor vehicle with the screw threaded shank 8 extending in a generally horizontal direction, or at a small angle to the horizontal, so that it projects laterally with respect to the pipe P. This avoids the disadvantage associated with the downwardly projecting screw threaded shanks which are characteristic of the U-bolt clamps conventionally used on exhaust pipes. The projecting end of the screw threaded shank 8 may, moreover, be used for attachment of the clamp, and therefore the exhaust pipe P, to a bracket or other fixture.

In order to avoid loss of the locking element 9 and the clamping nut 10 the extreme end of the screw threaded shank 8 may be provided with a small flange or burr preventing removal of the clamping nut 9. In an alternative embodiment (not illustrated), the flanged locking element 9 may be replaced by a split washer of spring steel located on the threaded shank 8.

Claims (Filed on 27 June 83)

1. A pipe clamp comprising a first part defining an arcuate surface forming one jaw of the clamp, an external channel provided at one end of the first part, and a second part having a permanent pivotal connection to the other end of the first part, the second part having an arcuate portion adjacent the pivot forming a second jaw and terminated in a straight screw threaded shank which, upon closure of the clamp, is located in and projects beyond one end of the channel, and a clamping nut which engages the projecting end of the threaded shank and which upon closure of the clamp can be tightened to bring a locking element into abutment with the said one end of the channel.

2. A pipe clamp according to Claim 1, in which the locking element abuts a shoulder on the first part of the clamp when the nut is tightened.

3. A pipe clamp according to Claim 2, in which the first part is provided with a notch adjacent the shoulder in which a key or flange carried by the locking element engages upon tightening of the nut to prevent opening of the clamp.

4. A pipe clamp according to Claim 3, in which the locking element comprises a washer having a central aperture through which the shank passes freely, the washer having a peripheral flange which engages in the notch in the first part.

5. A pipe clamp according to Claim 1 or Claim 2, in which the locking element comprises a split washer located on the shank.

6. A pipe clamp according to any one of Claims 1 to 5, in which the second part comprises a metal bar or rod having in cross section a flat portion for engagement with a pipe to be clamped.

7. A pipe clamp according to any one of Claims 1 to 5, in which the second part comprises a metal bar or rod formed with two or more circumferentially extending ribs on its internal concave surface for contacting the surface of a pipe to be clamped.

8. A pipe clamp according to any one of the preceding claims, in which the first part has a notch or notches in its inner arcuate surface to permit flexing of the said part to accommodate pipes of different sizes.

9. A pipe clamp according to any one of the preceding claims, in which the first part is pressed from sheet metal.

10. A pipe clamp substantially as herein described with reference to and as shown in the accompanying drawings.

Printed for Her Majesty's Stationery Office by the Courier Press, Leamington Spa, 1984. Published by the Patent Office, 25 Southampton Buildings, London, WC2A 1AY, from which copies may be obtained.